
CLAIMS

[Claim(s)]
[Claim 1] It is the image display device which is equipped with two or more light emitting devices which constitute the display screen, and the actuation circuit which drives said two or more light emitting devices corresponding to a video signal, and is characterized by said actuation circuit containing the control section which increases the brightness of two or more of said light emitting devices to decline in the luminous efficiency produced in said two or more light emitting devices.
[Claim 2] said control section -- said two or more light emitting devices and abbreviation -- the image display device according to claim 1 characterized by including the electrical-potential-difference detecting element which detects the electrical potential difference between terminals of the dummy light emitting device driven with a predetermined actuation current with equivalent structure, and said dummy light emitting device, and the current adjustment section which adjusts the actuation current of two or more of said light emitting devices based on the detection result of an electrical-potential-difference detecting element.
[Claim 3] Said current adjustment section is an image display device according to claim 2 characterized by including the signal amendment section which amends said video signal based on the detection result of said electrical-potential-difference detecting element.
[Claim 4] Said current adjustment section is an image display device according to claim 2 characterized by being constituted so that the electrical potential difference between terminals of two or more of said light emitting devices may be amended based on the detection result of said electrical-potential-difference detecting element.
[Claim 5] said two or more light emitting devices consist of two or more groups' light emitting devices -- having -- said control section -- the light emitting device of the group corresponding to each, and abbreviation -- two or more dummy light emitting devices driven with a predetermined actuation current with equivalent structure -- The electrical-potential-difference detecting element which detects the electrical potential difference between terminals of said two or more groups' light emitting device, and two or more dummy light emitting devices which go up with decline in the luminous efficiency produced, respectively by said two or more dummy light emitting devices similarly, And the image display device according to claim 1 characterized by including the current adjustment section which adjusts the actuation current of said two or more groups' light emitting device based on the detection result of said electrical-potential-difference detecting element, respectively.
[Claim 6] Said current adjustment section is an image display device according to claim 5 characterized by including the signal amendment section which amends said video signal based on the detection result of said electrical-potential-difference detecting element.
[Claim 7] It is the image display device according to claim 5 which each group's light emitting device is constituted so that light may be emitted with the response luminescent color, and is characterized by setting the actuation current of two or more of said dummy light emitting devices as a mutually different predetermined value depending on the brightness balance between these luminescent color.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the image display device using a light emitting device like for example, an organic electroluminescence (Electro Luminescence) component as a display pixel.
[0002]
[Description of the Prior Art] In recent years, since an organic electroluminescence display has the description of a light weight, a thin shape, and high brightness, it is observed as a monitor display of portable information machines and equipment like a cellular phone. A typical organic electroluminescence display is constituted so that an image may be displayed by two or more display pixels arranged in the shape of a matrix. In this organic electroluminescence display, two or more scanning lines are arranged along with the line which is these display pixel, two or more signal lines are arranged in accordance with the train of these display pixel, and two or more pixel switches are arranged near the crossover location of these scanning lines and a signal line. Each display pixel is constituted between an organic EL device and the power supply terminal of a couple by the actuation transistor connected to this organic EL device at a serial, and the capacitor holding the gate voltage of this actuation transistor. Each pixel switch answers the scan signal supplied from the response scanning line, and flows, and the video signal supplied from a response signal line is impressed to the gate of an actuation transistor. An actuation transistor supplies the actuation current according to this video signal to an organic EL device.
[0003] By having the structure which pinched the luminous layer which is a thin film containing red, green, or a blue fluorescence organic compound to a cathode electrode and anode inter-electrode, pouring an electron and an electron hole into a luminous layer, and making these recombine, an organic EL device makes an exciton generate and emits light by the light emission produced at the time of deactivation of this exciton. An anode electrode is a transparent electrode which consists of ITO(s) etc., and a cathode electrode is a reflector which consists of metals, such as aluminum. By this configuration, an organic EL device can obtain about two 100 - 100000 cd/m brightness also with the applied voltage not more than 10V.
[0004]
[Problem(s) to be Solved by the Invention] By the way, the luminous efficiency of an organic EL device falls depending on luminescence time amount (resistance welding time) or the amount of luminescence. The conventional organic EL device had the brief life until brightness will be halved by decline in this luminous efficiency, and it was difficult to continue using a display over a long period of time.
[0005] The object of this invention is to offer the image display device which can lengthen the life of a light emitting device more.
[0006]
[Means for Solving the Problem] According to this invention, it has two or more light emitting devices which constitute the display screen, and the actuation circuit which drives two or more light emitting devices corresponding to a video signal, and the image display device containing the control section

which increases the brightness of these light emitting devices to decline in the luminous efficiency which produced this actuation circuit in two or more light emitting devices is offered.
[0007] In this image display device, when the luminous efficiency of two or more light emitting devices falls, a control section increases the brightness of these light emitting devices. In this way, since decline in luminous efficiency is compensated, the life of a light emitting device can be lengthened until it becomes impossible to compensate decline in luminous efficiency. Therefore, it is possible to use an image display device over a long period of time more.
[0008]
[Embodiment of the Invention] Hereafter, the organic electroluminescence display concerning 1 operation gestalt of this invention is explained with reference to an accompanying drawing.
[0009] Drawing 1 shows the configuration of this organic electroluminescence display, and drawing 2 shows the configuration of some organic electroluminescence displays shown in drawing 1 more to a detail. An organic electroluminescence display is constituted by the external actuation circuit 30 which drives an organic EL panel 10 and an organic EL panel 10.
[0010] Two or more display pixels PX arranged in the shape of a matrix in order that this organic EL panel 10 may display an image on insulating substrates, such as glass Two or more pixel switches 13 arranged, respectively near the crossover location of two or more scanning lines 11 arranged along with the line of these display pixel PX, two or more signal lines 12 arranged in accordance with the train of these display pixel PX, these scanning lines 11, and a signal line 12, and two or more scanning lines 11 It has the scanning-line driver 14 to drive and the signal-line driver 15 which drives two or more signal lines 12. Each display pixel PX is constituted by the actuation transistor 17 which is connected to this organic EL device 16 at a serial between an organic EL device 16 and the power supply terminals DVDD and DVSS of a couple, for example, becomes by the P channel thin film transistor, and the capacitor 18 holding the gate voltage of this actuation transistor 17. Power supply terminals DVDD and DVSS are set as the potential of +12.5V and 0V with the supply voltage VEL supplied from the external actuation circuit 30.
[0011] Each pixel switch 13 is constituted by for example, the N channel thin film transistor, is controlled by the scan signal supplied from the response scanning line 11, and it writes a video signal in a capacitor 18 while it impresses the video signal supplied from the response signal line 12 to the gate of the actuation transistor 17. The actuation transistor 17 supplies the actuation current Id according to this video signal to an organic EL device 16. By having the structure which pinched the luminous layer which is a thin film containing a fluorescence organic compound to a cathode electrode and anode inter-electrode, pouring an electron and an electron hole into a luminous layer, and making these recombine, an organic EL device 16 makes an exciton generate, and emits light by the light emission produced at the time of deactivation of this exciton.
[0012] Here, the P channel thin film transistor which constitutes the N channel thin film transistor and the actuation transistor 17 which constitute the pixel switch 13 uses a polycrystal silicone film for the semi-conductor layer, and is constituted.
[0013] Moreover, the scanning-line driver 14 and the signal-line driver 15 are constituted by the N channel thin film transistor or P channel thin film transistor using the polycrystal silicone film formed at the same process as the pixel switch 13 and the actuation transistor 17, and are formed in one on the same insulating substrate.
[0014] The external actuation circuit 30 is formed on the printed circuit board arranged to the exterior of an organic EL panel 10. This external actuation circuit 30 is equipped with DC to DC converter 33 which generates and supplies each supply voltage which drives an organic EL panel 10 from the supply voltage of DA converter (DAC) 31 which changes a digital video signal into analog format, and is supplied to the signal-line driver 15, the scanning-line driver 14, the signal-line driver 15 and the controller 32 that controls DAC31, and the direct current supplied from the outside. A controller 32 minds the arithmetic circuit 34 which amends the digital video signal from the outside. A digital video signal and a synchronizing signal Reception, The vertical-scanning control signal which controls vertical-scanning timing, the horizontal scanning control signal which controls horizontal scanning

timing, And the DAC control signal which synchronized with a horizontal and vertical-scanning timing is generated based on a synchronizing signal. While supplying these vertical-scannings control signal, a horizontal scanning control signal, and a DAC control signal to the scanning-line driver 14, the signal-line driver 15, and DAC31, respectively, synchronizing with a horizontal and vertical-scanning timing, a digital video signal is supplied to DAC31.
[0015] DAC31 changes a digital video signal into analog format by control of a DAC control signal, and supplies it to the signal-line driver 15. The signal-line driver 15 makes the analog signal acquired from DAC31 one by one in each horizontal scanning period by control of a horizontal scanning control signal the analog video signal Vsig, and supplies it to two or more signal lines 12 in juxtaposition. The scanning-line driver 14 supplies a scan signal to two or more scanning lines 11 one by one in each frame period by control of a vertical-scanning control signal. That is, each scanning line is driven with a scan signal in a mutually different 1 horizontal-scanning period (1H). Only 1 horizontal-scanning period flows through the pixel switch 13 of each line with the scan signal supplied from the response scanning line 11, and it is un-flowing until a scan signal is again supplied in an one-frame period. The actuation transistor 17 for one line supplies the actuation current Id corresponding to the analog video signal Vsig supplied by the flow of these pixel switch 13 from two or more signal lines 12 to an organic EL device 16, respectively. This video signal Vsig is written in a capacitor 18, and is updated by every [which is an updating period] one-frame period (1F).
[0016] The organic EL panel 10 is equipped with two or more dummy display pixel PX' arranged at parallel at the train of the display pixel PX in the protection-from-light field used as the outside of the viewing area DA constituted by the matrix array of further two or more display pixels PX. moreover -- this -- a dummy -- a display -- a pixel -- PX -- ' -- meeting -- arranging -- having -- a dummy -- a display -- a pixel -- PX -- ' -- driving -- one -- a ** -- an auxiliary signal -- a line -- 12 -- ' -- plurality -- the scanning line -- 11 -- and -- an auxiliary signal -- a line -- 12 -- ' -- a crossover -- a location -- near -- arranging -- having -- plurality -- assistance -- a pixel -- a switch -- 13 -- ' -- and -- plurality -- a dummy -- a display -- a pixel -- PX -- ' -- connecting -- having -- an electrical potential difference -- a detecting element -- 20 -- having -- . On the other hand, the external actuation circuit 30 receives the digital video signal and synchronizing signal which are further obtained from an external computer etc., performs data processing of the video signal which synchronized with this synchronizing signal, and is equipped with the arithmetic circuit 34 which supplies that result to a controller 32.
[0017] each -- a dummy -- a display -- a pixel -- PX -- ' -- a display -- a pixel -- PX -- being equivalent -- structure -- it is -- a dummy -- an organic EL device -- 16 -- ' -- a couple -- a power supply terminal -- DVDD -- DVSS -- between -- this -- a dummy -- an organic EL device -- 16 -- ' -- a serial -- connecting -- having had -- a P channel -- a thin film transistor -- it is -- actuation -- a transistor -- 17 -- ' -- and -- this -- actuation -- a transistor -- 17 -- ' -- gate voltage -- holding -- a capacitor -- 18 -- ' -- constituting -- having . The scanning line 11 is connected to the display pixel PX and the gate of auxiliary pixel switch 13' [/ in common], and auxiliary signal line 12' is connected to the gate of actuation transistor 17' of two or more dummy display pixel PX' respectively through these auxiliary pixel switch 13'.
[0018] Each auxiliary pixel switch 13' is constituted by for example, the N channel thin film transistor, and when it drives with the scan signal supplied through the response scanning line 11, it impresses the dummy signal VC supplied from auxiliary signal line 12' to the gate of actuation transistor 17'. Actuation transistor 17' supplies actuation current Id' according to this dummy signal VC to dummy organic EL device 16'. For example, this dummy signal VC is a signal which makes dummy organic EL device 16' emit light with the maximum gradation, and is supplied to all dummy organic EL device 16'.
[0019] The electrical-potential-difference detecting element 20 has two or more electrical-potential-difference detector 20A which detects the electrical potential difference between terminals which connects with the ends child of dummy organic EL device 16' of each dummy display pixel PX', and is respectively generated among the ends children of response dummy organic EL device 16' according to the actuation current Id from response actuation transistor 17'. In data processing of an arithmetic circuit 34, the gradation value of a digital video signal is amended based on the average of the detection result of these electrical-potential-differences detector 20A, and is supplied to a controller 32 with a

synchronizing signal. A controller 32 controls the scanning-line driver 14 and the signal-line driver 15 corresponding to these video signals and a synchronizing signal, and each of the actuation transistor 17 of two or more display pixels PX adjusts the actuation current of the response organic EL device 16.
[0020] Drawing 3 shows the temporal response of the luminous efficiency of an organic EL device, and the electrical potential difference between terminals. The luminous efficiency of each organic EL device falls by the passage of time, and the electrical potential difference between terminals of this organic EL device rises with decline in luminous efficiency.
[0021] Since each dummy organic EL device 16' is structure equivalent to an organic EL device 16, the luminous efficiency of this dummy organic EL device 16' falls like an organic EL device 16, and the electrical potential difference between terminals of this dummy organic EL device 16' rises with decline in luminous efficiency.
[0022] Therefore, in this invention, the electrical potential difference between terminals of dummy organic EL device 16' is detected, and when luminous efficiency falls, the video signal which drives the display pixel PX is amended.
[0023] If it goes up as the electrical potential difference between terminals of these dummy organic EL device 16' is detected by two or more electrical-potential-difference detector 20A, respectively, for example, the electrical potential difference between terminals of two or more dummy organic EL device 16' shows drawing 3 with decline in luminous efficiency, it will be amended by the arithmetic circuit 34 so that the gradation value of a digital video signal may increase uniformly the actuation current of two or more organic EL devices 16 corresponding to lifting of the average of the electrical potential difference between these terminals. Consequently, it increases so that the brightness of each organic EL device 16 may compensate decline in luminous efficiency.
[0024] In the organic electroluminescence display of an above-mentioned operation gestalt, two or more organic EL devices 16 are formed as two or more light emitting devices which constitute the display screen. The scanning-line driver 14, the signal-line driver 15, a controller 32, DA converter 31, DC to DC converter 33, the scanning line 11, a signal line 12, the pixel switch 13, the actuation transistor 17, and a capacitor 18 are formed as an actuation circuit which drives two or more light emitting devices corresponding to a video signal. This actuation circuit has dummy organic EL device 16', and the electrical-potential-difference detecting element 20 and an arithmetic circuit 34 as a control section which increases the brightness of two or more organic EL devices 16 to decline in the luminous efficiency produced with two or more organic EL devices 16. It is prepared as a dummy light emitting device driven with a predetermined actuation current with equivalent structure. dummy organic EL device 16' -- two or more organic EL devices 16 and abbreviation -- an electrical potential difference -- a detecting element -- 20 -- plurality -- an organic EL device -- 16 -- the same -- a dummy -- an organic EL device -- 16 -- ' -- being generated -- luminous efficiency -- lowering -- following -- going up -- a dummy -- an organic EL device -- 16 -- ' -- a terminal -- between -- an electrical potential difference -- detecting -- a sake -- preparing -- having -- An arithmetic circuit 34 is formed in order to adjust the actuation current of two or more organic EL devices 16 by amending a video signal based on the detection result of the electrical-potential-difference detecting element 20.
[0025] Even if the luminous efficiency of an organic EL device 16 falls according to this configuration, it is maintained when the brightness of this organic EL device 16 amends the gradation value of a video signal. When a life until the brightness of an organic EL device 16 will be halved is 3000 hours, a reduction by half of this brightness can be delayed till about 7000 hours. The life of an organic EL device 16 can be prolonged more than twice to the case where decline in luminous efficiency is not compensated. Therefore, it is possible to use an organic electroluminescence display over a long period of time more.
[0026] In addition, this invention is variously deformable in the range which is not limited to an above-mentioned operation gestalt and does not deviate from the summary.
[0027] Although two or more dummy organic EL device 16' has been arranged at the organic EL panel 10, single organic EL device 16' is arranged, and you may make it only the electrical potential difference between terminals of this single organic EL device 16' amend the gradation value of a video signal with

an above-mentioned operation gestalt.
[0028] Moreover, although the same dummy signal VC as all dummy organic EL device 16' was supplied with the above-mentioned operation gestalt, a dummy signal VC which is not limited to this, for example, is different in each of dummy organic EL device 16' may be supplied, for example, the dummy signal VC corresponding to each gradation of the minimum gradation to the maximum gradation may be supplied.
[0029] Moreover, the analog video signal of the organic EL device 16 which may use for the dummy signal VC the analog video signal supplied to the signal line of arbitration, for example, adjoins dummy organic EL device 16' may be used.
[0030] Moreover, when two or more organic EL devices 16 consist of two or more groups' organic EL devices which consist of luminous layers from which a property differs, two or more dummy organic EL device 16' corresponding to each group's property may be constituted. these dummy organic EL device 16' -- the organic EL device 16 of the group corresponding to each, and abbreviation -- according to each group's component property, decline in luminous efficiency can be compensated with giving equivalent structure and a luminescence property for every group. namely, -- a dummy -- an organic EL device -- 16 -- ' -- predetermined -- actuation -- a current -- driving -- having -- an electrical potential difference -- a detecting element -- 20 -- plurality -- a group -- an organic EL device -- 16 -- the same -- plurality -- a dummy -- an organic EL device -- 16 -- ' -- respectively -- being generated -- luminous efficiency -- lowering -- following -- going up -- plurality -- a dummy -- an organic EL device -- 16 -- ' -- a terminal -- between -- an electrical potential difference -- detecting -- current adjustment -- the section -- an electrical potential difference -- a detecting element -- 20 -- detection -- a result -- being based -- a video signal -- amending -- plurality -- a group -- an organic EL device -- 16 -- actuation -- a current -- respectively -- adjusting -- as -- it can constitute .
[0031] When it is constituted so that each group's organic EL device 16 may emit light with the response luminescent color especially, dummy organic EL device 16' corresponding to each luminescent color is formed, and each dummy signal may be set as a mutually different predetermined value depending on the brightness balance between these luminescent color. The luminous efficiency of an organic EL device 16 of falling uniformly between the ingredient of a luminous layer and the different luminescent color is desirable in order that considering as such a configuration since it is not general may maintain a white balance.
[0032] Moreover, although it was amended based on the electrical potential difference between terminals of dummy organic EL device 16' with the above-mentioned operation gestalt since a video signal increased the brightness of two or more organic EL devices 16, supply voltage VEL may be increased, for example. Furthermore, when the luminescence time amount of a dummy organic EL device is restricted by the initial state and desired brightness has been obtained, since brightness is increased, it is also possible to lengthen actuation time amount.
[0033] Furthermore, although an above-mentioned operation gestalt and an above-mentioned modification were explained using an organic EL device 16 and dummy organic EL device 16', these organic EL devices 16 and dummy organic EL device 16' may be transposed to other light emitting devices in which self-luminescence is possible.
[0034]
[Effect of the Invention] According to this invention, the image display device which can lengthen the life of a light emitting device more can be offered.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the circuit diagram showing the configuration of the organic electroluminescence display concerning 1 operation gestalt of this invention.
[Drawing 2] It is the circuit diagram showing more the configuration of some organic electroluminescence displays shown in drawing 1 in a detail.
[Drawing 3] It is the graph which shows the temporal response of the luminous efficiency of the organic EL device shown in drawing 2 , and the electrical potential difference between terminals.
[Description of Notations]
16 -- Organic EL device
16' -- Dummy organic EL device
17 -- Actuation transistor
17' -- Actuation transistor
18 -- Capacitor
18' -- Capacitor
20 -- Electrical-potential-difference detector
20A -- Electrical-potential-difference detector
31 -- DAC
32 -- Controller
33 -- DC to DC converter
34 -- Arithmetic circuit
PX -- Display pixel
PX' -- Dummy display pixel
DVDD, DVSS -- Power supply terminal

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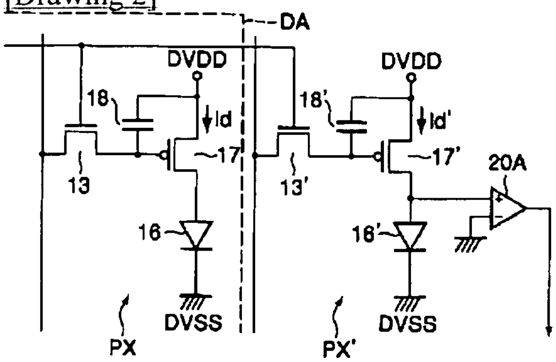
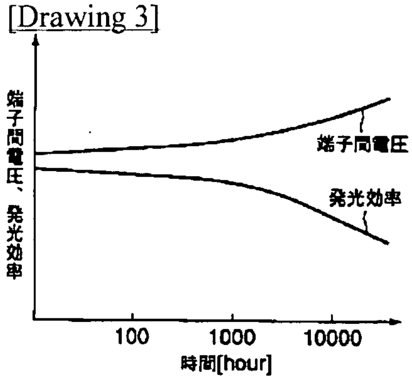
DRAWINGS

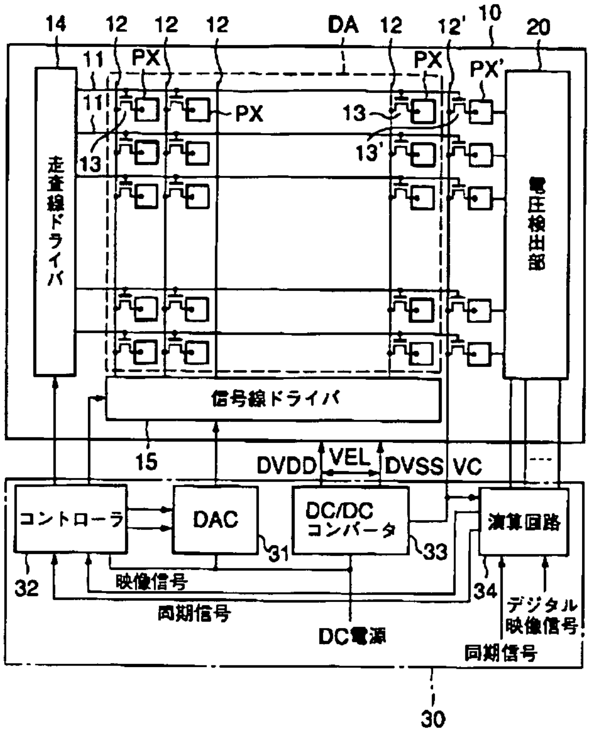
[Drawing 2]



[Drawing 3]



[Drawing 1]



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